

CONTRACTUAL DOCUMENTATION TO BE SUPPLIED BY CONTRACTORS

1. SCOPE

- 1.1 This Specification covers the contractual documentation to be supplied by contractors in the performance of Research and Development contracts.

2. REQUIREMENTS

- 2.1 General - In order to maintain proper control the progress and funding of Research and Development contracts, it is necessary that certain orderly reporting be accomplished by the Contractor on a regularly scheduled basis.

- 2.1.1 All documentation submitted by the Contractor shall bear the control number assigned by the Contracting Officer's Technical Representative. This control number shall appear on all correspondence, reports, etc., submitted by the contractor under the contract.

- 2.2 Types of Reports - The following types of reports shall be submitted by the contractor. Specific reports shall include, but not necessarily be limited to, the designated information.

- 2.2.1 Monthly - A monthly report shall be prepared as of the last working day of each calendar month. The first monthly report shall be prepared as of the last working day of the first full calendar month subsequent to the date of contract. Monthly reports shall be mailed so as to reach the consignee(s), stated in the contract, not later than the first business day after the fifteenth of the month following the reporting period. Each Monthly report shall provide the following, with negative reporting if applicable.

- 2.2.1.1 A statement of the activity on the project during the month and the percentage of work completed as of the reporting date.

- 2.2.1.2 A statement of the planned activity for the next month.
- 2.2.1.3 A statement of pending, unresolved technical problems.
- 2.2.1.4 A statement of pending, unresolved contractual problems.
- 2.2.1.5 A statement for the record, of agreements or understandings reached orally during the reporting period on technical matters not requiring the approval of the Contracting Officer.
- 2.2.1.6 A statement of any proposed change, agreement or understanding which requires the approval of the Contracting Officer. The contractor is cautioned not to proceed in a situation requiring the prior approval of the Contracting Officer until such approval has been obtained. In situations requiring correspondence with the Contracting Officer, a complimentary copy shall be forwarded, simultaneously, directly to the Contracting Officer's Technical Representative.
- 2.2.1.7 A statement of unanswered, unresolved matters, unanswered correspondence, etc., and whether delinquency is attributed to the contractor or to the Government.
- 2.2.1.8 Status of funds. The format shown in Enclosure 1 shall be used to report the status of funds. All applicable items shall be reported. If no expenditures or obligations have been incurred for a specific item, the word "None" shall be entered in the space assigned for the dollar amount.
- 2.2.2 Final Report - The final report shall be submitted to the Contracting Officer's Technical Representative on or before the thirtieth day following completion of the work under the contract. This report shall cover the entire design and/or development work accomplished during the period of performance and shall contain a section covering the work performed under each of the tasks set forth in the Work Statements. The report shall state concisely but completely the major problems encountered, the apparent cause of the problems, the problem solutions and an evaluation of the solutions based on actual application of the solutions.

2.2.3 Installation Engineering Data - Whenever hardware is a deliverable item under a contract the contractor shall provide the Installation Engineering Data requested on Enclosure 2. The Contracting Officer's Technical Representative shall provide the blank forms to the Contractor. Preliminary data shall be submitted to the Contracting Officer's Technical Representative at six months and again at three months prior to the delivery date of the equipment. Final data shall be submitted by the contractor not less than thirty days prior to the delivery of the equipment.

2.2.3.1 The outline drawing, submitted with the Installation Engineering Data form shall show:

- (a) the orientation of the equipment within the work area for normal equipment useage.
- (b) the exact location of all external connections.
- (c) the clearance required around the equipment for access to all removeable panels, doors, etc.
- (d) the location of mounting points and type of mounting required.

2.3. Delivery of Reports - All monthly reports and the final report shall be forwarded by the contractor to the Consignee(s) specified in the contract. The contractor shall forward each report in the number of copies specified in the contract.

2.3.1 The Installation Engineering Data form plus the outline drawing shall be forwarded to the Contracting Officer's Technical Representative.

Statement of Funds as of 30 September 19XX (See Note 1)

EXPENDITURES

1. Labor:			
a. Total paid as of 31 August 19XX	XX,XXX		
b. Paid during September 19XX	<u>X,XXX</u>		
c. Sub-total			XX,XXX
2. Material:			
a. Total paid as of 31 August 19XX	X,XXX		
b. Paid during September 19XX	<u>XXX</u>		
c. Sub-total			X,XXX
3. Services (sub-contracts, etc.):			
a. Total paid as of 31 August 19XX	X,XXX		
b. Paid during September 19XX	<u>XXX</u>		
c. Sub-total			<u>X,XXX</u>
4. Total expenditures as of 30 September 19XX			XX,XXX

OBLIGATIONS AND ESTIMATES

5. Obligations:			
a. Sub-contract W/ABC Co., amount not yet paid	X,XXX		
b. Sub-contract W/DEF Co., amount not yet paid	XXX		
c. Material ordered but not yet paid for	<u>XXX</u>		
Sub-total			X,XXX
6. Estimates of Future Expenditures:			
a. Estimate of labor required	X,XXX		
b. Estimate of material required	XXX		
c. Proposed sub-contracts	<u>XXX</u>		
Sub-total			<u>X,XXX</u>
Total			XX,XXX

NOTES:

1. All amounts shown above must include overhead, G&A, handling charges, fees, etc.

INSTALLATION ENGINEERING DATA

Date form completed _____

(See Remarks at end of form)

Tentative ☐ Valid until _____

Final data ☐

I. INSTRUMENT

- A. Name of instrument: _____
B. Manufacturer: _____
C. Contract number: _____
D. Delivery date: Tentative: _____ Final: _____

II. PHYSICAL FEATURES

- A. Sub-assemblies:
1. Number of sub-assemblies: _____
2. Largest sub-assembly: Weight _____ lbs; _____" H x _____" W x _____" D
3. Heaviest sub-assembly: Weight _____ lbs; _____" H x _____" W x _____" D
B. Assembled instrument:
1. Number of major components: _____
2. Largest component: Weight _____ lbs; _____" H x _____" W x _____" D
3. Heaviest component: Weight _____ lbs; _____" H x _____" W x _____" D
4. Total floor space required after assembly, including maintenance access space. _____ Ft. _____ In. High x _____ Ft. _____ In. Wide x _____ Ft. _____ In. Deep.
5. Total weight of assembled instrument: _____ lbs.
C. Type of base of mount: Flat _____; 3-point suspension _____; 4-point suspension _____
D. Does the instrument have built-in mobility? Yes _____ No _____
E. Is the instrument particularly sensitive to vibration? Yes _____ No _____
Will the instrument generate vibration? Yes _____ No _____
F. Are any special or unusual tools or fixtures necessary or advisable for the installation of the maintenance of this instrument? Yes _____ No _____.
If "Yes," please describe: _____

III. UTILITIES

- A. Electrical:
1. Voltage _____ Volts $\frac{AC}{/}$ _____ Volts _____ Volts $\frac{DC}{/}$ _____
2. Current _____ Amps/phase _____ Amps
3. Frequency _____ cps
4. Nr. of phases _____ Ph
5. Nr. of wires _____
6. Power required _____ Watts _____ Watts
7. Power factor _____ (Leading) (Lagging)
8. Type of outlet: Two prong _____; three prong _____; Twist lock _____; Perm. _____
9. Type of ground: Building conduit _____; Direct earth ground _____
10. Should the instrument be shielded, either from external electromagnetic signals or to prevent interference with other equipment? Yes _____ No _____
If "Yes," to what extent? _____

B. Air conditioning:

1. Desired environment: Room air temperature of ____ °F / ____ °F and relative humidity of ____ % / ____ %.
2. Input Air: Is a direct connection necessary? Yes ____ No ____; Adviseable? Yes ____ No ____; If "Yes," what is the connector type and size? ____ Recommended input air temperature ____ °F / ____ °F. Relative humidity ____ % / ____ %. If input air must be filtered, what is the maximum particle size in microns? ____ What particle count? ____ / cu. ft.
3. Output Air: Is a direct connection to the return air duct necessary? Yes ____ No ____ Adviseable? Yes ____ No ____ Connector type and size? ____ Output air temperature ____ °F / ____ °F. Relative humidity ____ % / ____ %. Output heat ____ BTU/Hr. Flow of ____ CFM. Is output air toxic? Yes ____ No ____; Noxious? Yes ____ No ____.

C. Plumbing:

1. Is water required? Yes ____ No ____; Pressure ____ PSIG, flow ____ GPM.
2. Type of water required:
Tap ____ °F / ____ °F Deionized ____ °F / ____ °F
Tempered ____ °F / ____ °F Filtered ____ °F / ____ °F
If filtered, give maximum permissible particle size in microns and the maximum permissible count. ____ microns ____ particles/cu. ft.
3. Pipe required:
Galvanized ____ Copper ____ Size ____
Stainless Steel ____ Plastic ____ Type of connector ____
4. Floor drain:
Diameter of drain ____ Galvanized drain? ____
Plastic drain? ____ Glass drain? ____
5. Are any chemical solutions used in the device? Yes ____ No ____ If "Yes," state the nature of the solution(s), permissible temperature range, flow rate in appropriate units and the filtration necessary for each solution ____.
6. Size of pipes and connectors ____.

D. Compressed air:

Is compressed air required? Yes ____ No ____ Water free? ____ Oil Free? ____
Type and size of connector? ____ Pressure ____ PSIG. Flow in CFM
Maximum ____, minimum ____, average ____.

E. Vacuum:

Is vacuum required? Yes ____ No ____ Pressure ____ PSIA or (inches of water) (millimeters of mercury). Displacement in CFM, maximum ____, minimum ____, average ____ Type and Size of connectors ____.

F. Peripheral Devices:

Will the instrument be connected to any peripheral devices such as a computer or data input or data output device? Yes ____ No ____ If "Yes," give, in detail, the nature of the connection to the peripheral device such as coaxial cable, multiple wire connector, etc.

IV. REMARKS

- A. Use additional sheets if more space is required for environmental conditions or utilities not mentioned above.
- B. Submit three typed copies of the completed form to the Technical Representative.

- C. Attach three copies of a dimensioned outline drawing of each major component and of the completed assembly. Include the estimated weight of each major component and of the completed assembly. Indicate, on the outline drawing of the completed assembly, the space required for access to the instrument for maintenance.
- D. If a question does not apply to the instrument, insert "N/A" (Not Applicable) in the appropriate blank space.

Information provided by:

(Signature)

(Position or job title)

Attachment 2
Specification No. DB-1003
Issue Date: 31 August 1966

GENERAL REQUIREMENTS FOR THE PREPARATION
OF TECHNICAL MANUALS

1. SCOPE

- 1.1 This specification covers the general requirements for the preparation of technical manuals. The requirements of this specification shall apply to manuals which describe the operation of equipment and to manuals which cover the maintenance of equipment.

2. APPLICABLE DOCUMENTS

- 2.1 The following document forms a part of this specification.
U.S. Government Printing Office Style Manual.

3. REQUIREMENTS

- 3.1 General - The text shall be factual, specific, concise and so clearly worded as to be readily understandable. It shall:
- (a) Provide sufficient information to insure peak performance of the equipment.
 - (b) Omit discussions of theory except where essential for practical understanding and application.
 - (c) Reflect engineering knowledge in the most easily understood wording possible.
 - (d) Avoid technical phraseology requiring a specialized knowledge, except where no other wording will convey the intended meaning.
- 3.2 Types of Manuals - Two types of manuals will normally be supplied by the contractor on all equipment oriented contracts. The minimum content of each type of manual shall be as specified below and in following sub-paragraphs.

- 3.2.1 Operators Manual - This type of manual should contain only that information needed to operate the equipment efficiently and safely. The Operators Manual will normally include the following data:

- Front matter
- Introduction or General Information
- Operating Instructions
- Operators Maintenance
- Emergency Procedures

- 3.2.2 Maintenance Manual - This type of manual should be written for use by personnel who are qualified technicians in the field of optics, mechanics, and electronics. The purpose of this manual is to provide the necessary instructions to properly perform routine preventative maintenance and to be able to quickly locate and repair or replace defective components. The Maintenance Manual will normally include the following data:

- Front Matter
- Functional Description
- Checkout Procedures
- Trouble Shooting Procedures
- Servicing
- Removal & Replacement Procedures
- Repair Procedures
- Parts List

- 3.3 Contents - Manuals shall contain the following data arranged as indicated in paragraph 3.2. Where indicated sections obviously do not apply, or when additional information is required, the proposed changes in coverage or format shall be submitted to the technical representative for approval.

- 3.3.1 Front Matter - Standard front matter, listed in the normal sequence of appearance, shall consist of the following:

Cover and Title Page - The cover shall contain the information shown in Figure I.

The title page shall contain the information shown in Figure II.

Table of Contents - The table of contents shall list all primary divisions (sections, and sub-sections) with their corresponding page numbers. In multi-volume manuals, each volume shall contain its own table of contents. See Figure III for the suggested format.

List of Illustrations - The list of illustrations shall contain a complete listing of figures, titles, and page numbers. In multi-volume manuals, each volume shall contain its own list of illustrations. See Figure IV for the suggested format.

List of Tables - The list of tables shall contain a complete listing of all tables, titles, and page numbers. In multi-volume manuals, each volume shall contain its own list of tables. See Figure V for the suggested format.

Frontispiece - The frontispiece shall contain a photograph or sketch of the equipment or system. In multi-volume manuals, each volume shall contain its own frontispiece.

3.3.2 General Information - The operators manual shall include an overall description of the functions and purpose of the equipment. This information is intended for use by personnel requiring a general summary of the equipment or system and its performance, advantages and limitations.

3.3.3 Description - The functioning of the equipment or system as a whole and its inter-related units shall be described. The functional description shall be non-technical in nature and shall describe the intended use, capabilities, and the limitations of the equipment or system. Flow diagrams, schematic diagrams and functional block diagrams necessary for understanding system or equipment functions and performing trouble analysis will be included in this section. Text covering physical descriptions, or structural arrangements shall be brief. Special attention should be given to avoidance of unnecessary details that are easily illustrated. A list of equipment supplied, together with the approximate volume, weight, and overall dimensions of each unit, as applicable, shall be included. In addition, a compilation of quick-reference data shall be included. The quick-reference data shall consist of pertinent technical or design characteristics of the equipment. Examples of such data are:

(a) Functional characteristics, such as:

- Power requirement
- Types of operation
- Power output
- Frequency
- Pulse characteristics
- Sensitivity; selectivity

(b) Capabilities, such as:

Rated ranges
Coverage
Resolution
Accuracy

(c) Rated outputs, such as:

Wattages
Voltages
Horsepower

(d) Special characteristics, such as:

Operating temperatures
Pressure
Humidity
Tolerances

(e) Other pertinent characteristics

3.3.4 Operating Instructions - Operating instructions shall contain the essential information required by the operator for normal operation of the equipment or system. This shall include such instructions as are necessary for setting up or preparing the equipment for use, required warm-up procedures, starting the equipment, verifying normal operation, shut down and post shutdown requirements. Where procedures are to be performed in a specific sequence, step-by-step procedures shall be given and shall include any tables or charts necessary to present such procedures. Adequate illustrative material shall supplement the text, to identify and locate all operating control and indicating devices.

3.3.5 Operator's Maintenance - The information provided shall include any maintenance procedures within the capability of an operator. This capability is limited to procedures governing periodic inspection, cleaning, servicing, preservation, lubrication, adjustment, and minor parts replacement (fuses, dry batteries, indicator lamps, and so forth) which do not require the need for internal alignment or complex adjustment.

3.3.6 Emergency Procedures - Emergency procedures shall consist of actions taken in the event of equipment malfunction. Safe shut down and methods of reactivating the equipment shall be included. Detailed step-by-step procedures on specific sequential operations shall be presented in tabular, checklist form to the maximum extent feasible.

- 3.3.7 Checkout Procedures - Step-by-step checkout procedures required to verify satisfactory operations shall normally be presented in tabular form. The instructions shall clearly indicate why the checkout is performed and what conditions are to be sought. When malfunctions occur, references to appropriate trouble shooting procedures shall be made.
- 3.3.8 Servicing - Servicing requirements include cleaning, lubricating, replacement procedures and other preventive maintenance procedures which apply to the particular equipment. For systems, reference shall be made to the applicable equipment manuals which spell out various servicing procedures.
- 3.3.9 Trouble Shooting - The manual shall provide adequate details for quickly and efficiently locating the cause of an equipment malfunction. The discussion shall contain concise information on how the equipment operates. The discussions shall be in order of operational or data sequence, as applicable. Block diagrams, performance curves, and nomographs shall be used to support the discussion whenever necessary. Trouble-shooting information required to localize any trouble to a particular functional division (or unit) shall be included to serve as a guide in isolating faults.
- 3.3.10 Removal and Replacement Procedures - These procedures shall provide step-by-step procedures for removal and replacement of items which are subject to frequent replacement. These instructions should provide for a judicious combination of text and illustrations. Obvious detail steps should be omitted. If special tools are required they shall be listed immediately preceding the detailed instructions for the job.
- 3.3.11 Repair Procedures - Only the repair procedures which must be performed in place shall be provided. These instructions shall provide the necessary information to bring the equipment up to the required serviceable standard when it becomes unserviceable. If checkout is required to verify satisfactory operation of the equipment, applicable reference to the appropriate section of the manual shall be made.
- 3.3.12 Parts List - The parts list shall include identification data covering all maintenance parts, to facilitate ready identification of the parts for replacement and ordering purposes. Standard hardware, structural parts, or other parts which have no maintenance significance shall not be listed. A brief introduction, if appropriate, and the applicable tables listed below shall be included:

- (a) The tabulation shall consist of the following data: reference designation, alphabetically-numerically keyed to an illustration or schematic diagram; part name; description or function; and the manufacturer's name and part number.
- (b) When appropriate, a list of any special tools supplied with the equipment or required for maintenance shall be provided at the end of the parts list.

3.3.13 Schematic - A schematic wiring diagram shall be provided for electrical or electronic equipment.

3.4 Style -

3.4.1 Grammar - Person and Mode - The third person indicative mode shall be used for discussion and description. The second person imperative mode shall be used for operating procedures.

3.4.2 Rules - Capitalization, spelling, compound words, and punctuation shall be in accordance with the Government Printing Office Style Manual.

3.4.3 Special Instructions - Modifications to the text of the manual shall be in accordance with the following:

NOTE: An operating procedure, condition, etc., which it is essential to highlight.

CAUTION: Operating procedures, practices, etc., which if not strictly observed, will result in damage to or destruction of equipment.

WARNING: Operating procedures, practices, etc., which will result in personal injury or loss of life if not correctly followed.

When used, cautions and warnings should immediately precede the applicable instructions. Notes, cautions and warnings shall not be numbered.

3.4.4 Definitions -

Change - Modification of information in an existing manual.

Revision - Second or subsequent edition of a manual which supersedes the preceding edition.

- Reprint - Second or subsequent printing of a manual without change.
- Addendum - Addition to a manual which can be inserted into the proper place in the manual.
- Supplement - Subsidiary document which complements information in a manual.
- 3.4.5 Measurement - Units of measurement shall be those accepted and used in the technical field under discussion; units in the text shall conform to the units used on instruments and other indicators on the equipment.
- 3.4.6 Pagination - Pagination for the Table of Contents shall be small Roman numerals, i.e., i, ii, iii, iv, v, etc., in lower right hand corner of the page. Pagination for the body of the manual shall be Arabic numerals, i.e., 1, 2, 3, 4, 5, etc., in lower right hand corner of the page.
- 3.4.7 Security - If a classification is necessary, it shall be assigned on the contract. The appropriate classification shall be centered and printed or stamped 1/2 inch from the top and bottom of the front and back covers and on each page of the manual, including illustrations, in letters 1/4 inch or more high. Other controls and restrictions that are required shall be outlined on a specific basis.
- 3.4.8 Reference Method - The method of referencing within a manual shall be as follows: to sections - by section number; to tables - by table number; to illustrations - by figure number. If a manual is divided into volumes, the volume number shall be included as part of the reference.
- 3.4.9 Identification - Section headings shall be centered and numbered consecutively with an Arabic numeral followed by a period and the title in capital letters; e.g.
1. GENERAL INFORMATION. Sections shall start at the margin and be numbered consecutively with an Arabic numeral, which corresponds to the numeral in the section heading, followed by a period, another Arabic numeral consecutively numbered, and the title in capitals and lower case: e.g.,

1.1 Scope. Sub-sections shall start 1/2 inch from the margin and be numbered consecutively in the same manner as the sections with the addition of a period, followed by an Arabic numeral consecutively numbered, and the title in capitals and lower case; e.g., 1.1.1 Special content.

3.4.10 Illustrations - Illustrations shall be identified by a figure number in Roman numerals, and title. The figure number and title shall be positioned immediately beneath the illustration as held in a reading position. In addition, illustrations shall be positioned as near as possible to the applicable text material.

3.4.11 Tables - Tables shall be identified by a table number in Arabic numerals, and title. The table number and title shall be positioned above the table as held in a reading position. In addition, tables shall be positioned as near as possible to the applicable test material.

3.4.12 Page Ending - Pages shall begin and end with a paragraph.

3.5 Reproduction and Production -

3.5.1 Kinds of Reproduction - Whenever practical, manuals shall be reproduced by multilith, letter press or some photo offset means. When the number of copies required dictates a more economical reproduction method, the proposed method must be approved by the technical representative.

3.5.1.1 When the contract specifies that reproducible copy of the instruction manual is a deliverable item, such copy shall be prepared for offset printing. Art work will be supplied in accordance with the applicable paragraphs of 3.6.

3.5.2 Size - Manuals shall be 8 1/2 x 11 inches, unless otherwise specified.

3.5.3 Number of Copies - Unless otherwise specified, one copy of each type of manual shall be provided for each piece of equipment supplies plus a surplus of 50 percent. A minimum of two copies of each type of manual will be supplied.

3.5.4 Paper - The paper used shall be good quality paper appropriate for the reproduction method used.

3.5.5 Covers - Covers shall be of flexible plastic or good quality paper stock. Covers need not include any printed matter (other than security classification) if suitable cut-out windows are provided.

- 3.5.6 Binding - Manuals shall normally be provided as bound volumes, with saddle or side-stitching. If specified in individual cases or when approved by the technical officer, manuals may be provided in loose leaf form.
- 3.5.7 Trade Marks - In no instance, except in the Parts List shall the manufacturer's name, signature, symbol, or trade mark appear in the text, cover, or illustrations.

3.6 Art -

- 3.6.1 Scale - Illustrations shall be to as small a scale as possible with all essential detail legible; be same size as areas they will occupy on the manual page or such over-size as to permit uniform reduction to this size.

3.6.2 Line Art -

(a) Line art shall be of high reproduction quality. India ink or other suitable material capable of maintaining consistent high density tonal values shall be used for preparing the line drawings.

(b) Only copy prints of pencil drawings shall be acceptable. Engineering drawings which may not have been prepared primarily for illustration purposes are acceptable as illustrations if the copy is legible, reproducible and readable when reduced in size.

(c) Line weights shall be of sufficient strength to reproduce clearly at required reproduction size. Parallel lines on wiring and schematic diagrams, as a general rule, shall be not less than 1/8 inch and in no case less than 1/16 inch apart when reduced to printed size.

(d) Secondary lines such as those used to indicate extensions or measurements shall be of lighter weight but strong enough to reproduce clearly at reproduction size. Shading effects shall not be used for decorative purposes or be permitted to distort or destroy the form. Lines, cross-hatching or patterns used for shading shall be of sufficient size to withstand the process of reduction to reproduction size.

- 3.6.3 Continuous Tone Art - All art containing tonal values of grey as well as black, which is not created by lines or dots, shall be considered Continuous Tone Art. Such art, whether photograph or drawing, shall be clear in

detail, sharp in contrast of tones and with light and shadow in proper relation to the actual light source. Separation of planes shall be shown by differences in tonal values rather than by lines.

- 3.6.4 Retouching - Photographic retouching shall be held to the absolute minimum by utilizing good photography to clarify planes by tonal separation, emphasize essential detail, correct slight camera defects and eliminate undesirable shadow. Quality shall be such that tonal values are held when reproduced.
- 3.6.5 Additional Requirements for Photography - Glossy prints shall be made from crisp, clear, well-exposed negatives. They shall be detailed and sharp, be free of heavy shadows, distorted objects, cluttered foregrounds or backgrounds, and give good contrast from white, middle tones and black.
- 3.6.6 Combination Art - Representation of a subject by combining line and continuous tone art shall be limited to where this treats the subject better.
- 3.6.7 Tables, Charts, Graphs - The use of tables, charts, graphs shall be considered and handled as illustrations whether produced in line, halftone or tabular form.
- 3.6.8 Cartoons - Cartoons and similar material shall only be used in manuals when authorized by the technical officer.
- 3.6.9 Tints and Patterns - Tints, patterns, cross-hatching, dots, etc. in black and white shall be used in lieu of colors.
- 3.6.10 Fold-out Sheets - Fold-out sheets shall be used only when the material cannot be satisfactorily presented on a single page.
- 3.6.11 Cropping and Marking Art - Separate art shall have the reproduction area defined on all four sides by crop marks which shall extend at least 3/4 inch beyond illustration. The exact reproduction size shall be indicated between the required marks.
- 3.6.12 Marking Art for Identification - Art shall bear the figure number, title, security classification, if required, and page number, when it comprises a full page.

- 3.6.13 Defining Direction of Art Placement - All art shall have the top clearly marked. Identification shall be outside the reproduction area.
- 3.6.14 Callouts on Art - Callouts on art shall be used when necessary to explain or identify significant features or components. Index numbers shall start with Arabic number 1 and run consecutively. Sequence shall be from top to bottom or clockwise. Nomenclature on line art of more than one line shall have the left-hand margin justified.
- 3.6.15 Keying Index Numbers - When index numbers are used, a key consisting of the numerical listings and their corresponding nomenclatures shall be included in (or adjacent to) the art. Keys used outside art shall be below or adjacent to art and precede figure number and title.
- 3.6.16 Callout Lines - Lines shall be uniform, short and straight as possible. They shall end close to callout and object. Lines shall not cross or come in contact with other lines nor shall they obscure essential details.
- 3.6.17 Instructions in Procedural Illustrations - Procedural illustrations shall have one or more brief text steps with each illustrated step. The text shall be as close to the illustrated step as possible. Steps shall be numbered consecutively in Arabic numerals in the order in which they are to be accomplished, beginning with Arabic number 1.
- 3.6.18 Mounting Art - Separate art shall be rendered or mounted on board of two ply or more. Dimensions of the mount shall include a minimum border of 3/4 inch on all four sides of the illustration area.
- 3.6.19 Covering Art - Continuous tone art shall be protected by an outer flap of heavy paper and an inner flap of tissue or vellum. Line art shall be protected by outer cover only.
- 3.7 Mechanical Features - Manuals shall be prepared in accordance with the mechanical specifications outlined in Table 1.
- 3.8 Quality Control Provision -
 - 3.8.1 Preparation - An outline shall be prepared which gives a detailed breakdown of all elements to be covered including planned charts, tables, schematics, and other illustrations. The outline should be discussed with the technical

representative and a manuscript developed which shall be submitted for approval as soon as possible or at least 30 days before completion of the production sample. In all cases, the proposed manuals shall be received and approved by the technical representative before final printing.

3.8.2 Inspection - Manuals shall be inspected to determine compliance with the requirements of this specification and for equivalence with the approved manuscript. In addition, the content of the manual shall be checked against the equipment being furnished to assure that it depicts accurately and adequately the equipment and the operating and maintenance procedures required.

3.9 Packaging and Shipment - Manuals shall be packaged separately in bulk and shipped to the same address and at the same time that the equipment is shipped. Manuals shall be packaged in containers which comply with the carrier regulations applicable to the mode of transportation. If manuals are classified, shipments shall be in accordance with security regulations.

3.9.1 Shipment of Reproducible Materials - Art work and reproducible text material furnished by the contractor shall be packaged in containers which comply with the carrier regulations applicable to the mode of transportation, and shipped to the address indicated in the contract or supplied by the technical officer. If material is classified, shipments shall be in accordance with security regulations.

TECHNICAL DESCRIPTION FOR [] HIGH POWER
STEREO COMPARATOR HEAD

25X1

This instrument is to be used as the optical viewing subsystem of a photographic measuring instrument. It is a major redesign of the High Power Stereoviewers manufactured on previous contracts with the U.S. Government. The primary change is in the optical system, to enable the reticles to be placed in an intermediate image plane, rather than in the eyepieces where they can be displaced when adjusting the interpupillary distance (IPD). Mechanical changes are required to accommodate the optical changes. In addition, the eyepiece angle will be adjustable.

The instrument consists of two [] Dynazoom Laboratory Microscopes coupled with an optical system to form a stereoviewer. The Dynazoom pod has a continuously variable magnification from 1X to 2X. A magnification range from 7.8X to 200X is covered with 6X and 10X [] Compensating Widefield eyepieces and 1.3X, 3.0X, 6X, and 10X objectives. The 3.0 and 6X objectives are not both needed to cover the magnification range, but the 3.0X objective gives a wider field and the 6X objective gives higher resolution.

25X1

25X1

Each optical system consists of an objective, the zoom elements, a pentaprism to direct the path horizontally, an image rotation prism (Pechan), reticle, a field lens, a mirror to incline the path toward the eyepieces, a 1X relay lens, a field lens, and the eyepiece.

The following objectives are to be used with this instrument:

<u>Catalog #</u>	<u>Magnification</u>	<u>Focal Length</u>	<u>Numerical Aperture</u>
[] Special Order	1.3X		
[] Fluotar (5100)	3.0X	26.3 mm	0.10
[] Fluotar (5105)	6X	21.0 mm	0.20
[] Fluotar (5050)	10X	15.0 mm	0.45

25X1
25X1

The objective lenses are mounted in a four-position centerable nose-piece. The [] 3X, 6X and 10X objectives are parfocal and require very little refocusing when changing objectives.

25X1

The 1.3X [] objective is a special, wide field lens designed primarily to help locate the object to be measured. It is not designed for the [] eyepieces, but works well with it.

25X1

25X1

The zoom is adjusted by means of a knob on the top of each pod. It is graduated from 1X to 2X in tenths.

The housing above the zoom system has been redesigned and, due to the complexity of the penta prism mount, the ability to provide monocular viewing or photomicrography has been omitted.

The Pechan prism rotates the image continuously without limit. An 180° rotation of the prism rotates the image 360°. The prism mount has a knurled knob for turning and numbers to indicate approximately the amount of image rotation.

The reticle is mounted in a two-position slide, so that the reticle will consist of an engraved and filled black dot, $0.016 \pm .004$ mm, in the center of the field.

The IPD of the eyepieces is adjustable by means of a lever through a range of 55 to 72mm. The eyepieces are nominally 30° to the horizontal and are adjustable $\pm 7\frac{1}{2}^\circ$ for operator convenience.

Adjustment of the eyepiece angle causes image rotation. A graduated scale reads the eyepiece angle. This angle must be transferred to a slip ring to set the "Zero" index for the Pechan prism which automatically compensates for the image rotation due to changing the eyepiece angle.

The centers of the objectives will be nominally 12.102 inches apart.

During the course of a measurement sequence, the Zoom knob and the image rotation prism must not be rotated. The nosepiece must not be rotated nor the centering adjustment moved.

The following eyepieces are to be used:

<u>Catalog #</u>	<u>Magnification</u>
<input type="checkbox"/> Compensating (5551)	6X
<input type="checkbox"/> Compensating (5583)	10X

Resolution, field of view, etc. depend on the combination of eyepiece and objectives used and the position of the zoom system. The following table gives the nominal field size for combinations of the above listed eyepieces and objectives when the zoom is at 1X. When the zoom is at a position other than 1X, the total magnification is multiplied by the zoom magnification, and the field is divided by the zoom magnification.

<u>Eyepiece</u>	<u>Objective</u>	<u>Magnification</u>	<u>Field</u>
6	1.3	7.8	14.0mm
6	3.0	18	6.0mm
10	1.3	13	14.0mm
6	6	36	3.0mm
10	3.0	30	6.0mm
6	10	60	1.8mm
10	6	60	3.0mm
10	10	100	1.8mm

25X1

With the 10X eyepieces, the zoom at 2X and the 10X Fluotar objective, the instrument will have a maximum axial resolution of approximately 1200 lines per mm.

25X1

Additional information on the viewing system may be obtained from: "Instructions, The Stereocomparator Viewing System, dated July 1965.

25X1

Attachment 4

TECHNICAL SPECIFICATIONS FOR THE OPTICAL SYSTEM IF
THE [] STEREOVIEWER IS NOT USED

25X1

1. Magnification. Magnification shall be continuously variable from 7X through 200X. This may be accomplished by the use of a high-resolution, zoom-type system and exchangeable objective elements (turret-mounted). If exchangeable objectives are used, the ranges of the magnification shall have an overlap of at least 10% at each stage and the objectives shall be parfocal.

2. Resolution. The on-axis resolution of the entire system, including anamorphic magnification, must be at least 8 line-pairs/mm per magnification power at a magnification of 7X, decreasing linearly to no less than 6 line-pairs/mm per magnification power at 200X. The zoom system shall not depart from linearity by more than 2%, and the resolution over the entire field of view at any specific magnification shall not decrease by more than 20% from that exhibited on-axis.

3. Image Quality. Image quality available to the operator should, at all magnifications, approximate that of a very high-performance microscope with respect to: aberration corrections, field size, field flatness, numerical aperture, visual acuity, contrast, and resolution; e.g., image quality at least equivalent to that exhibited by the [] High-Power Stereoviewer--equipped with the 3X (N.A. = .10), 6X (N.A. = .20), and 10X (N.A. = .45) [] Fluotar objectives used in conjunction with their 6X and 10X Compensating Widefield High Eyepoint eyepieces--should be provided.

25X1

4. Field of View. Both the real and the apparent fields of view shall approximate that of high performance microscope design at all powers. Viewing will be by binocular eyepieces--an angular field of 35° or better is a design goal.

5. Independent Zoom. The optical image paths must provide both independent and common zoom magnification.

6. Image Rotation. Optical image rotation of 360° shall be provided for each optical path. This shall not introduce distortion or displacement with respect to the reticle.

7. Anamorphic Correction. Each eyepath shall incorporate anamorphic correction with a continuously variable ratio from 1:1 to 1:2.2. The direction of anamorphic magnification must be rotatable through 360°. It is highly desirable that this element or optical path be separate so that it is capable of being in or out of the system at the viewer's option so as to not impose a constant restraint upon the overall optical quality of the system in these situations when anamorphic correction is not required.

8. Focus. Independent focus shall be provided for each optical axis, and means shall be provided for adjusting the differences in focus between the right and left eyes of the operator. Both a coarse and fine instrument focus shall be provided. The gear ratios of these focus motions must be appropriate to the magnification ranges involved.

9. Interpupillary Distance Adjustment. An adjustment for variation in interpupillary distances of between 52mm and 80mm shall be provided, together with an easily readable graduated scale to indicate actual millimeter settings. This adjustment must be provided with a positive lock.

10. Eye-piece Positioning. The eyepiece unit shall be inclined up, toward the operator at an angle of 30° measured up from the horizontal and shall be adjustable over a range of $\pm 15^{\circ}$. A positive lock must be provided for this adjustment so that once a comfortable position is achieved it can be retained.

11. Eyepoint. The optical system must be designed to accommodate viewing by operators both with and without eyeglasses.

12. Eyeshields. Separate pairs of eyeshields for the eyepieces shall be provided for use by persons with and without eyeglasses.

13. Objective Design. Computation and design of the matched objective elements shall take into account a satisfactory but safe working distance from the glass pressure plate, large field of view, and visual fidelity of the highest order. Allowance for the glass of the pressure plate shall be incorporated into the design of the objective lenses.

14. Depth of Field. Maximum depth of focus, while still maintaining a flat field and adequate aberration corrections, is of special importance, since images on photographic films with a thickness tolerance of ± 0.15 mil. will be the prime input to this system. A capability shall be provided to focus the high power objective elements for viewing film emulsion up or down for film bases ranging in thickness from 2 to 7 mil.

15. It is a design goal that an optical switching system be provided to permit binocular monoscopic viewing of either the right or left stage (whichever one is the measuring stage) in place of the normal stereoscopic viewing of both stages concurrently.

16. Reticle. The reticle shall be introduced as close to the objective lens as possible to avoid problems of parallax. It shall be a circular dot with a clearly defined edge. The size of the reticle dot shall be variable with magnification from one-half minute to four minutes of arc.

DATA ACQUISITION SPECIFICATIONS

1. Input Devices.

The input devices shall consist of the two-axis encoders and a control panel. The control panel shall enable the operator to pre-set the counters and to feed auxiliary information to the computer through various switches. The control panel shall also provide a visual digital display of the relative X and Y coordinate positions.

1.1 Encoders. The type of system shall be selected by the contractor.

1.2 Control Panel. The control panel shall be a Computer Measurements Company control panel model 2825A or equivalent.

2. Signal Processing Device.

The signal processing device shall provide a direct communication link between the coordinate measuring equipment and a central computer on a real time basis. Transmission between the computer and the remote station is to be via two PWC S4193 cables or equivalent (One wire in the cable is for send, one wire is for receive, and one or two wires are for ground) this cable will be provided. (Steps have been taken to reduce interference from outside sources). One transmission cable, initiating at the central computer site, is to be connected to a Teletype Model KSR35 page printer. The contractor, however, is to have no responsibility for the Teletype except for consideration of placement and possible electromagnetic interference from it. The second cable from the computer is to be connected to the signal processing device. There will be no data connection between the teletype and the signal processing device except through the computer link.

2.1. Transmission Interface.

2.1.1 Transmission is asynchronous with the rate of transmission to be fixed at 1200 bits per second $\pm 1\%$ tolerance, and is binary serial.

2.1.2 A negative voltage (optimum -10 volts) represent-off or marking (1), a positive voltage (optimum +10 volts) represents on or spacing (0). The signals should have a high impedance.

2.1.3 In addition to the information bits to be transmitted, two pulsing bits must be transmitted for each character.

A start pulse is a space (0) and is of the same duration as that of the other bits. A stop pulse is a mark (1) and is a minimum of 1.5 bits in length.

2.2. Code Requirements. The code to be transmitted will meet the following requirements.

2.2.1 Code to be used will be a Field Data Code, consisting of a 6-bit character, plus one odd parity bit.

2.2.2 The 2^0 power, or least significant information bit, is the first bit to be transmitted from each character.

2.2.3 Parity is to be the 2^6 power bit and is the last information bit of each character to be transmitted.

2.3. Message. The message to be generated by the measuring equipment system shall consist of the following:

2.3.1 Digital coordinate values in microns for each axis of the system shall normally consist of six decades (plus sign) per axis.

2.3.2 A start of message character (SOM).

2.3.3 An end of transmission character (EOT). (This bit configuration would normally be a parity error).

2.3.4 A message parity count (MPC). This is the sum of bits of all characters transmitted (including SOM and EOT), and is a non-carry add. Lateral parity is odd. Longitudinal parity is even. The parity bit is to be the sum of the longitudinal parity bits.

2.3.5 Four special instruction characters, each generated by four operator-controlled push on, push off back-lighted switches, two dummy bits (mark or 1), and a parity bit generated by the equipment based upon the condition of the four switches. The fixed dummy bits will occupy the 2^4 and 2^5 bit positions.

2.3.6 A special readout character generated by five momentary-contact push button switches and two fixed dummy bits occupying the 2^2 and 2^6 bit positions. The dummy bits are to be spaces or 0's. It is understood that the parity (2^6) is to be fixed at 0 so that if two of the five switches are pressed at the same time, a parity error will be detected. The five switches are to be understood as readout switches and will also control the request to send, SOM and text as later described.

2.3.7 Three rotary switches are to be provided for machine identification purposes. These switches are to have the capability to create 0 to 9 and are to be placed in the equipment so that only the maintenance engineers will have the capability to change them.

2.3.8 A minimum of 10 twelve-position rotary switches. These switches are to have the capability of producing 0 to 9, minus (-), and space.

2.3.9 The output sequence shall be as described in Appendix A.

2.4. Special Circuits. There is to be no character-by-character acknowledge signal received by the digitizer output circuit. However, there is to be a message acknowledge or error received on the basis of the total message transmitted. The reply will consist of SOM, A or E, EOT, and MPC. In addition, a timer is to be incorporated in the equipment to trigger an alarm if the reply is not received within 3 seconds. The output is to be held in the digitizer buffer until an acknowledge is received or the timer alarm is triggered. If an error signal is received due to a bad transmission, the timer is to be reset and another attempt at transmission is to be made. After a set number of attempts at retransmission (under computer control), an acknowledge or error signal will not be returned and the timer will cycle out. If a readout is initiated but never reaches the computer, the timer will also cycle out, warning the operator that the transmission has not taken place. The return acknowledge or error will not be transmitted until the digitizer transmission is completed.

In addition, an indicator light is to be placed on the control panel in close proximity to the readout switches. On depressing any one of the five readout switches the light is to turn on and remain on for approximately one second or until an acknowledge signal is received, whichever is longer. This will indicate to the operator that a readout has been initiated within the digitizer.

A numerical display of the coordinate system should be placed on the control panel within the operator's field of view. A reset button for each axis shall be placed on the control panel. It is also mandatory that a master reset button be provided, along with a manual set feature for each decade of the counter, to give the operator the ability to set the counter value to a pre-determined value other than zero. A set of two 2-position direction of count switches shall also be included on the control panel.

2.5 Sequence of Operations. Having properly set up the measuring equipment as instructed, the operator will proceed to take measurements and thus transmit data. Prior to actuating the readout mechanism, he will set up the necessary computation instructions on the 16 push on,

push off switches comprising the four instruction characters. Then, upon aligning the reference mark with the image, he will depress one of the five readout switches comprising the readout character.

Upon actuating one of the five readout switches, the digitizing system will set the timer, energize the readout indicator light, lock the count in the buffer and visual displays, and send the bit message to the computer. If the computer receives the message and there is no error in it, the computer will send back an acknowledge signal. When the digitizing system receives an error message, it will re-start the timer, energize the readout light, and retransmit the data. The computer has been programmed to repeat the error signal cycle only a set number of times. If after a set number of tries, the computer cannot accept a message, it will not reply to the digitizing system. When the digitizing system receives no reply, the timer completes its cycle, sets off an audible alarm, and releases the buffer storage and visual displays. When an alarm occurs, the operator is to reset the alarm circuits by a push button on the control panel and attempt inputting the message again. If this fails, he is under instructions to call Maintenance.

3. General Physical Requirements.

3.1. Circuit Design. Required performance and critical output timing demand maximum reliability and rapid maintenance. The circuitry must be solid state. Where possible, all circuitry should be on plug-in, printed-circuit cards, with a minimum number of different types used. The design should be to the highest possible commercial standards to insure maximum performance.

3.2. Console Design. The circuitry should all be mounted on standard racks which in turn should be mounted in a single console. The console should be on locking casters and should be of rigid enough construction to withstand constant (at least three or four times daily) moving about within an area. The control panel should be mounted on the console in such a manner that it could be easily viewed and reached by a seated operator.

4. Other Specifications.

4.1. Maximum storage shall be +999999 for each axis.

4.2. The numerical display shall be an in-line Nixie tube or a 1" projection-type display. Negative numbers are to be displayed as true numbers with a sign (not 9's complement). The visual digital display will be in the metric system with a least count of 1 micron.

4.3. The power requirement for the device shall be 100 - 125 volts, maximum 15 amps, 60 cycle AC.

APPENDIX A

Typical Readout Sequence

Output Sequence	2^6	2^5	2^4	2^3	2^2	2^1	2^0
1. SOM	1	0	1	1	0	1	1
2. Readout Character	0	0	X	X	X	X	X
3. Instruction Character	P	1	1	X	X	X	X
4. Instruction Character	P	1	1	X	X	X	X
5. Instruction Character	P	1	1	X	X	X	X
6. Instruction Character	P	1	1	X	X	X	X
7. Sign plus	1	0	0	0	1	0	1
minus	1	1	0	0	0	0	1
8. X value 10^5							
9. X value 10^4							
10. X value 10^3							
11. X value 10^2				0 to 9			
12. X value 10^1							
13. X value 10^0							
14. Sign plus	1	0	0	0	1	0	1
minus	1	1	0	0	0	0	1
15. Y values 10^5							
16. Y values 10^4							
17. Y values 10^3							
18. Y values 10^2				0 to 9			
19. Y values 10^1							
20. Y values 10^0							
21. (Machine identifiers)							
22. (Machine identifiers)				0 to 9			
23. (Machine identifiers)							
24. 12 Position Rotaries							
25. 12 Position Rotaries							
26. 12 Position Rotaries							
27. 12 Position Rotaries							
28. 12 Position Rotaries							
29. 12 Position Rotaries							
30. 12 Position Rotaries				0 to 9			
31. 12 Position Rotaries							
32. 12 Position Rotaries							
33. 12 Position Rotaries							
34. EOT	1	0	1	0	1	0	1
35. MPC							

NOTE: The switches are prevented from turning to the twelfth position by mechanical stops.

X = bits controlled by operator switches

P = Parity bit generated by equipment as required on the basis of the condition of the X positions.

2^6 2^5 2^4 2^3 2^2 2^1 2^0
0 = 1 1 1 0 0 0 0

1 = 0 1 1 0 0 0 1

2 = 0 1 1 0 0 1 0

3 = 1 1 1 0 0 1 1

4 = 0 1 1 0 1 0 0

5 = 1 1 1 0 1 0 1

6 = 1 1 1 0 1 1 0

7 = 0 1 1 0 1 1 1

8 = 0 1 1 1 0 0 0

9 = 1 1 1 1 0 0 1

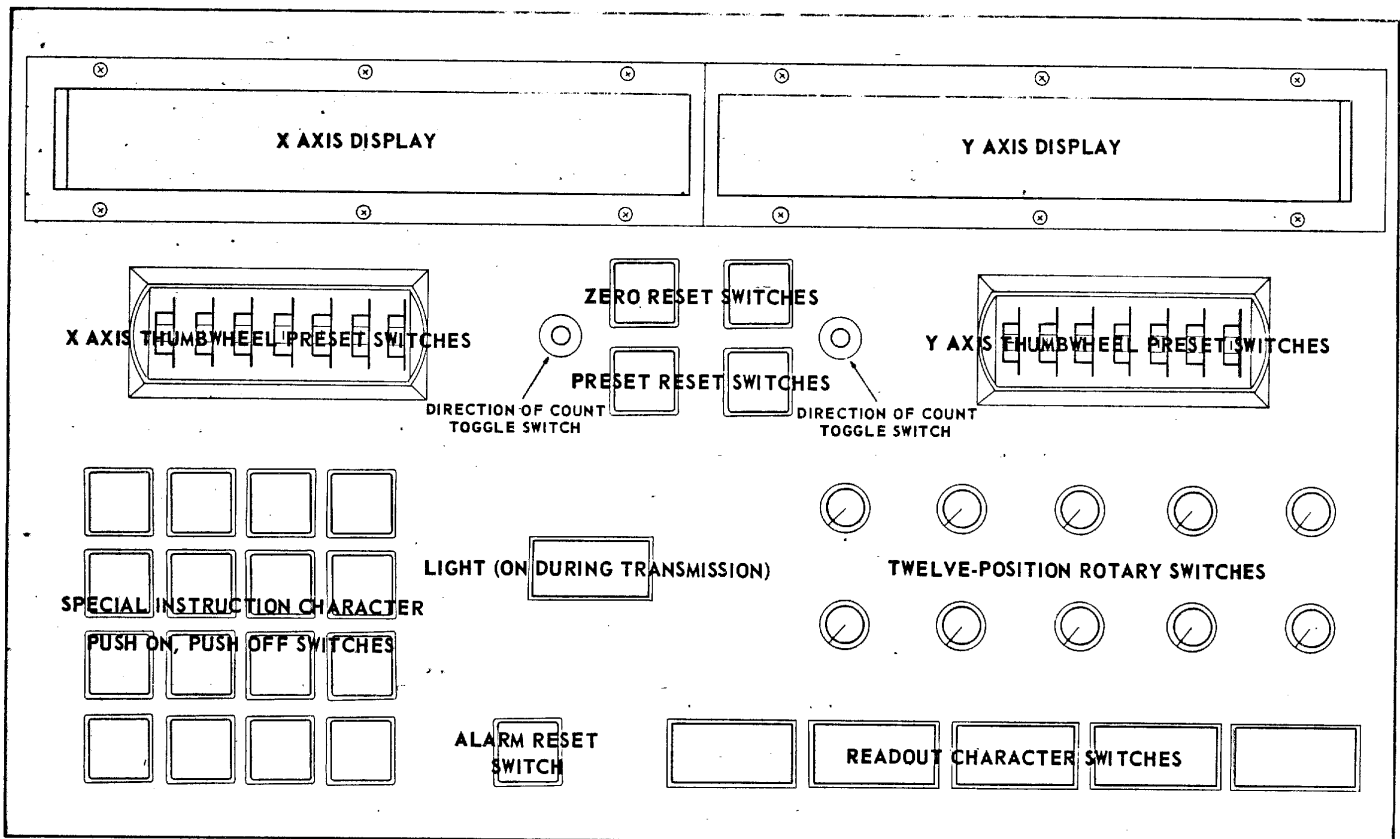
- = 1 1 0 0 0 0 1

EOT = 1 0 1 0 1 0 1

Error = 1 0 0 1 0 1 0

Acknowledge = 1 0 0 0 1 1 0

Approved For Release 2005/05/02 : CIA-RDP78B04770A001200010010-8



CONTROL PANEL

MODEL 2825A

Approved For Release 2005/05/02 : CIA-RDP78B04770A001200010010-8

1 INCH = 2 INCHES

APPENDIX R

25X1

Next 4 Page(s) In Document Exempt

25X1

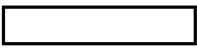


January 16, 1968


U. S. Government

Attn: Mr. Bill K.


Gentlemen:

In response to your  we are pleased to provide the following quotation as an amendment to our proposal furnished in response to RD-10-68.

25X1

Item #1 Digitization of second stage of the Twin Stage On-Line PI Comparator including adaptation for data heads, data heads, and necessary measurement readout display 

25X1

Delivery of the above would be concurrent with the original proposal, and this quotation is firm for a period of 60 days. Our terms are Net 30 days, and all prices are fob  This quotation is for a single comparator.

25X1

We trust that this information is sufficient for your further consideration of our proposed instrument.

Sincerely yours,



25X1

Director of Marketing

ACT/mw

25X1



DATA ACQUISITION SPECIFICATIONS

1. Input Devices.

The input devices shall consist of the two-axis encoders and a control panel. The control panel shall enable the operator to pre-set the counters and to feed auxiliary information to the computer through various switches. The control panel shall also provide a visual digital display of the relative X and Y coordinate positions.

1.1 Encoders. The type of system shall be selected by the contractor.

1.2 Control Panel. The control panel shall be a control panel model 2825A or equivalent.

25X1

25X1

2. Signal Processing Device.

The signal processing device shall provide a direct communication link between the coordinate measuring equipment and a central computer on a real time basis. Transmission between the computer and the remote station is to be via two PWC S4193 cables or equivalent (One wire in the cable is for send, one wire is for receive, and one or two wires are for ground) this cable will be provided. (Steps have been taken to reduce interference from outside sources). One transmission cable, initiating at the central computer site, is to be connected to a Teletype Model KSR35 page printer. The contractor, however, is to have no responsibility for the Teletype except for consideration of placement and possible electromagnetic interference from it. The second cable from the computer is to be connected to the signal processing device. There will be no data connection between the teletype and the signal processing device except through the computer link.

2.1. Transmission Interface.

2.1.1 Transmission is asynchronous with the rate of transmission to be fixed at 1200 bits per second ± 1% tolerance, and is binary serial.

2.1.2 A negative voltage (optimum -10 volts) represent-off or marking (1), a positive voltage (optimum +10 volts) represents on or spacing (0). The signals should have a high impedance.

2.1.3 In addition to the information bits to be transmitted, two pulsing bits must be transmitted for each character.

A start pulse is a space (0) and is of the same duration as that of the other bits. A stop pulse is a mark (1) and is a minimum of 1.5 bits in length.

2.2. Code Requirements. The code to be transmitted will meet the following requirements.

2.2.1 Code to be used will be a Field Data Code, consisting of a 6-bit character, plus one odd parity bit.

2.2.2 The 2^0 power, or least significant information bit, is the first bit to be transmitted from each character.

2.2.3 Parity is to be the 2^6 power bit and is the last information bit of each character to be transmitted.

2.3. Message. The message to be generated by the measuring equipment system shall consist of the following:

2.3.1 Digital coordinate values in microns for each axis of the system shall normally consist of six decades (plus sign) per axis.

2.3.2 A start of message character (SOM).

2.3.3 An end of transmission character (EOT). (This bit configuration would normally be a parity error).

2.3.4 A message parity count (MPC). This is the sum of bits of all characters transmitted (including SOM and EOT), and is a non-carry add. Lateral parity is odd. Longitudinal parity is even. The parity bit is to be the sum of the longitudinal parity bits.

2.3.5 Four special instruction characters, each generated by four operator-controlled push on, push off back-lighted switches, two dummy bits (mark or 1), and a parity bit generated by the equipment based upon the condition of the four switches. The fixed dummy bits will occupy the 2^4 and 2^5 bit positions.

2.3.6 A special readout character generated by five momentary-contact push button switches and two fixed dummy bits occupying the 2^2 and 2^0 bit positions. The dummy bits are to be spaces or 0's. It is understood that the parity (2^6) is to be fixed at 0 so that if two of the five switches are pressed at the same time, a parity error will be detected. The five switches are to be understood as readout switches and will also control the request to send, SOM and text as later described.

2.3.7 Three rotary switches are to be provided for machine identification purposes. These switches are to have the capability to create 0 to 9 and are to be placed in the equipment so that only the maintenance engineers will have the capability to change them.

2.3.8 A minimum of 10 twelve-position rotary switches. These switches are to have the capability of producing 0 to 9, minus (-), and space.

2.3.9 The output sequence shall be as described in Appendix A.

2.4. Special Circuits. There is to be no character-by-character acknowledge signal received by the digitizer output circuit. However, there is to be a message acknowledge or error received on the basis of the total message transmitted. The reply will consist of SOM, A or E, EOT, and MPC. In addition, a timer is to be incorporated in the equipment to trigger an alarm if the reply is not received within 3 seconds. The output is to be held in the digitizer buffer until an acknowledge is received or the timer alarm is triggered. If an error signal is received due to a bad transmission, the timer is to be reset and another attempt at transmission is to be made. After a set number of attempts at retransmission (under computer control), an acknowledge or error signal will not be returned and the timer will cycle out. If a readout is initiated but never reaches the computer, the timer will also cycle out, warning the operator that the transmission has not taken place. The return acknowledge or error will not be transmitted until the digitizer transmission is completed.

In addition, an indicator light is to be placed on the control panel in close proximity to the readout switches. On depressing any one of the five readout switches the light is to turn on and remain on for approximately one second or until an acknowledge signal is received, whichever is longer. This will indicate to the operator that a readout has been initiated within the digitizer.

A numerical display of the coordinate system should be placed on the control panel within the operator's field of view. A reset button for each axis shall be placed on the control panel. It is also mandatory that a master reset button be provided, along with a manual set feature for each decade of the counter, to give the operator the ability to set the counter value to a pre-determined value other than zero. A set of two 2-position direction of count switches shall also be included on the control panel.

2.5 Sequence of Operations. Having properly set up the measuring equipment as instructed, the operator will proceed to take measurements and thus transmit data. Prior to actuating the readout mechanism, he will set up the necessary computation instructions on the 16 push on,

push off switches comprising the four instruction characters. Then, upon aligning the reference mark with the image, he will depress one of the five readout switches comprising the readout character.

Upon actuating one of the five readout switches, the digitizing system will set the timer, energize the readout indicator light, lock the count in the buffer and visual displays, and send the bit message to the computer. If the computer receives the message and there is no error in it, the computer will send back an acknowledge signal. When the digitizing system receives an error message, it will re-start the timer, energize the readout light, and retransmit the data. The computer has been programmed to repeat the error signal cycle only a set number of times. If after a set number of tries, the computer cannot accept a message, it will not reply to the digitizing system. When the digitizing system receives no reply, the timer completes its cycle, sets off an audible alarm, and releases the buffer storage and visual displays. When an alarm occurs, the operator is to reset the alarm circuits by a push button on the control panel and attempt inputting the message again. If this fails, he is under instructions to call Maintenance.

3. General Physical Requirements.

3.1. Circuit Design. Required performance and critical output timing demand maximum reliability and rapid maintenance. The circuitry must be solid state. Where possible, all circuitry should be on plug-in, printed-circuit cards, with a minimum number of different types used. The design should be to the highest possible commercial standards to insure maximum performance.

3.2. Console Design. The circuitry should all be mounted on standard racks which in turn should be mounted in a single console. The console should be on locking casters and should be of rigid enough construction to withstand constant (at least three or four times daily) moving about within an area. The control panel should be mounted on the console in such a manner that it could be easily viewed and reached by a seated operator.

4. Other Specifications.

4.1. Maximum storage shall be ± 999999 for each axis.

4.2. The numerical display shall be an in-line Nixie tube or a 1" projection-type display. Negative numbers are to be displayed as true numbers with a sign (not 9's complement). The visual digital display will be in the metric system with a least count of 1 micron.

4.3. The power requirement for the device shall be 100 - 125 volts, maximum 15 amps, 60 cycle AC.

APPENDIX A

Typical Readout Sequence

Output Sequence	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰
1. SOM	1	0	1	1	0	1	1
2. Readout Character	0	0	X	X	X	X	X
3. Instruction Character	P	1	1	X	X	X	X
4. Instruction Character	P	1	1	X	X	X	X
5. Instruction Character	P	1	1	X	X	X	X
6. Instruction Character	P	1	1	X	X	X	X
7. Sign plus	1	0	0	0	1	0	1
minus	1	1	0	0	0	0	1
8. X value 10 ⁵							
9. X value 10 ⁴							
10. X value 10 ³							
11. X value 10 ²				0 to 9			
12. X value 10 ¹							
13. X value 10 ⁰							
14. Sign plus	1	0	0	0	1	0	1
minus	1	1	0	0	0	0	1
15. Y values 10 ⁵							
16. Y values 10 ⁴							
17. Y values 10 ³							
18. Y values 10 ²				0 to 9			
19. Y values 10 ¹							
20. Y values 10 ⁰							
21. (Machine identifiers)							
22. (Machine identifiers)				0 to 9			
23. (Machine identifiers)							
24. 12 Position Rotaries							
25. 12 Position Rotaries							
26. 12 Position Rotaries							
27. 12 Position Rotaries							
28. 12 Position Rotaries							
29. 12 Position Rotaries							
30. 12 Position Rotaries				0 to 9			
31. 12 Position Rotaries							
32. 12 Position Rotaries							
33. 12 Position Rotaries							
34. EOT	1	0	1	0	1	0	1
35. MPC							

NOTE: The switches are prevented from turning to the twelfth position by mechanical stops.

See text

X = bits controlled by operator switches

P = Parity bit generated by equipment as required on the basis of the condition of the X positions.

2⁶ 2⁵ 2⁴ 2³ 2² 2¹ 2⁰
0 = 1 1 1 0 0 0 0

1 = 0 1 1 0 0 0 1

2 = 0 1 1 0 0 1 0

3 = 1 1 1 0 0 1 1

4 = 0 1 1 0 1 0 0

5 = 1 1 1 0 1 0 1

6 = 1 1 1 0 1 1 0

7 = 0 1 1 0 1 1 1

8 = 0 1 1 1 0 0 0

9 = 1 1 1 1 0 0 1

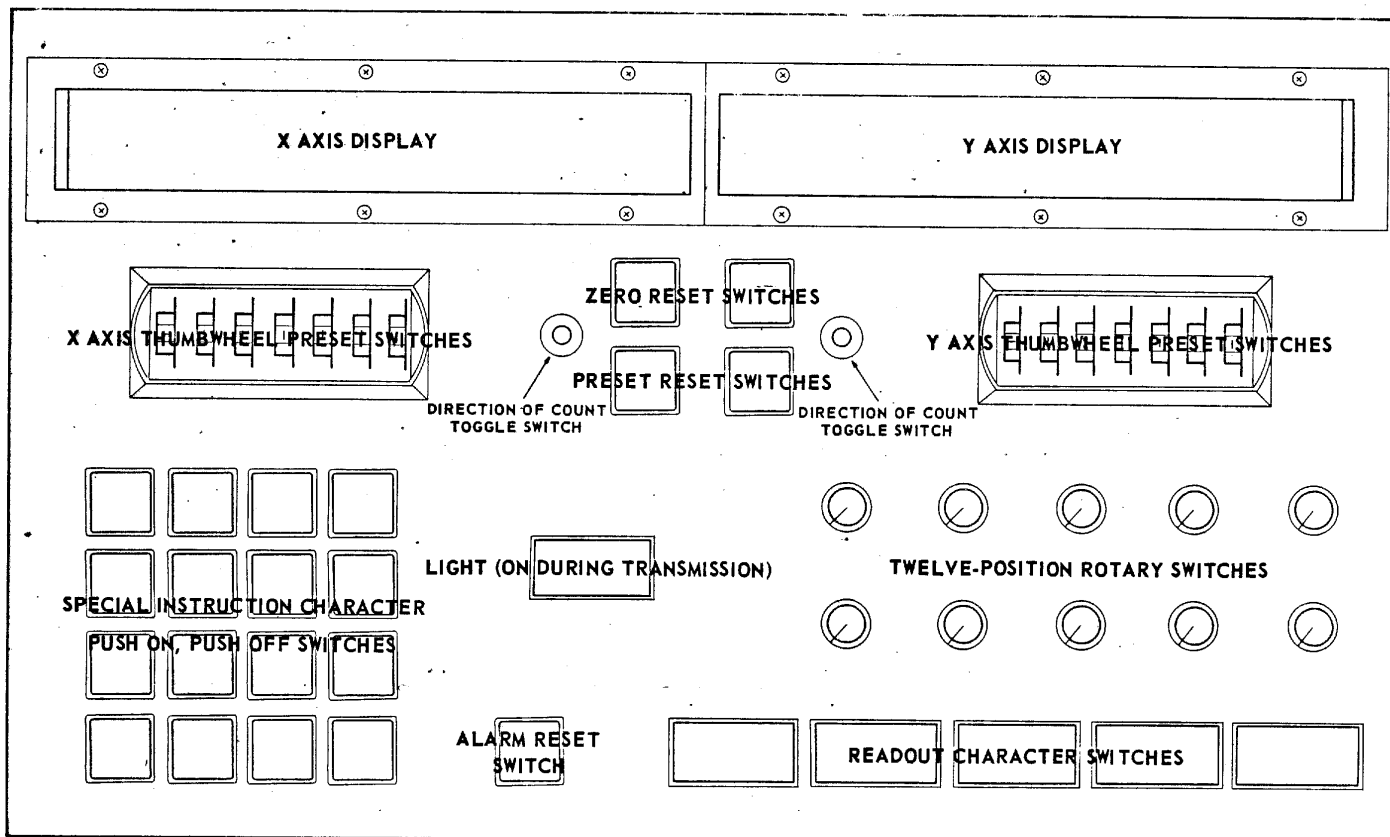
- = 1 1 0 0 0 0 1

EOT = 1 0 1 0 1 0 1

Error = 1 0 0 1 0 1 0

Acknowledge = 1 0 0 0 1 1 0

Approved For Release 2005/05/02 : CIA-RDP78B04770A001200010010-8



CONTROL PANEL

MODEL 2825A

Approved For Release 2005/05/02 : CIA-RDP78B04770A001200010010-8
1 INCH = 2 INCHES

SECRET

Approved For Release 2005/05/02 : CIA-RDP78B04770A001200010010-8

NPIC/TDS/D-1065-67
11 October 1967

MEMORANDUM FOR: Chief, Procurement Division, OL

ATTENTION [REDACTED]

THROUGH : Chief, Support Staff, NPIC

SUBJECT Request for Proposals for a Twin Stage On-Line Comparator
#02228

1. It is requested that copies of the enclosed Development Objectives entitled Twin Stage On-Line PI Comparator be sent to the organizations listed on the enclosed sheet. These organizations should be instructed to submit proposals prior to 5 November 1967 in response to the requirements set forth in the objectives.

2. Agency association is classified CONFIDENTIAL.

3. The nature of the work to be proposed on is UNCLASSIFIED.

4. The Technical Development Staff plans to commit funds amounting to [REDACTED] for Fiscal Year 1968 to this project.

5. In your communications with prospective contractors, it is requested that the project number be used as listed above and be included as part of the title.

[REDACTED]
Colonel, USAF
Assistant for Technical Development, NPIC

Enclosures: (2)

1. List of Prospective Contractors
2. Development Objectives

Distribution:

- Orig & 1 - Addressee
- 1 - NPIC/SS
- 1 - NPIC/A/TD
- ✓ 3 - NPIC/TD/DS

NPIC/TDS/DS [REDACTED] (11 Oct 67)

Approved For Release 2005/05/02 : CIA-RDP78B04770A001200010010-8

SECRET

GROUP 1
Excluded from automatic
downgrading and
declassification

*Material from here back is
02227 - Pre contract actions (FY67)*